(54) **SOUND PLAYER WITH A SEPARABLE MEMORY**

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(57) **ABSTRACT**

A sound player includes a first module including a first connector and a memory electrically connected to the first connector for storing digital audio data. The sound player further includes a second module including a controller for controlling the operation of the sound player, a flash memory electrically connected to the controller for storing digital audio data, a second connector electrically connected to the controller for connecting to the first connector in a detachable manner, a user interface operable to allow a user to input a signal to the controller for selecting digital audio data stored in the flash memory of the second module or for selecting digital audio data stored in the memory of the first module through the first connector and the second connector, a decoder for converting selected digital audio data into audio signals, and an audio output port for outputting the audio signals.
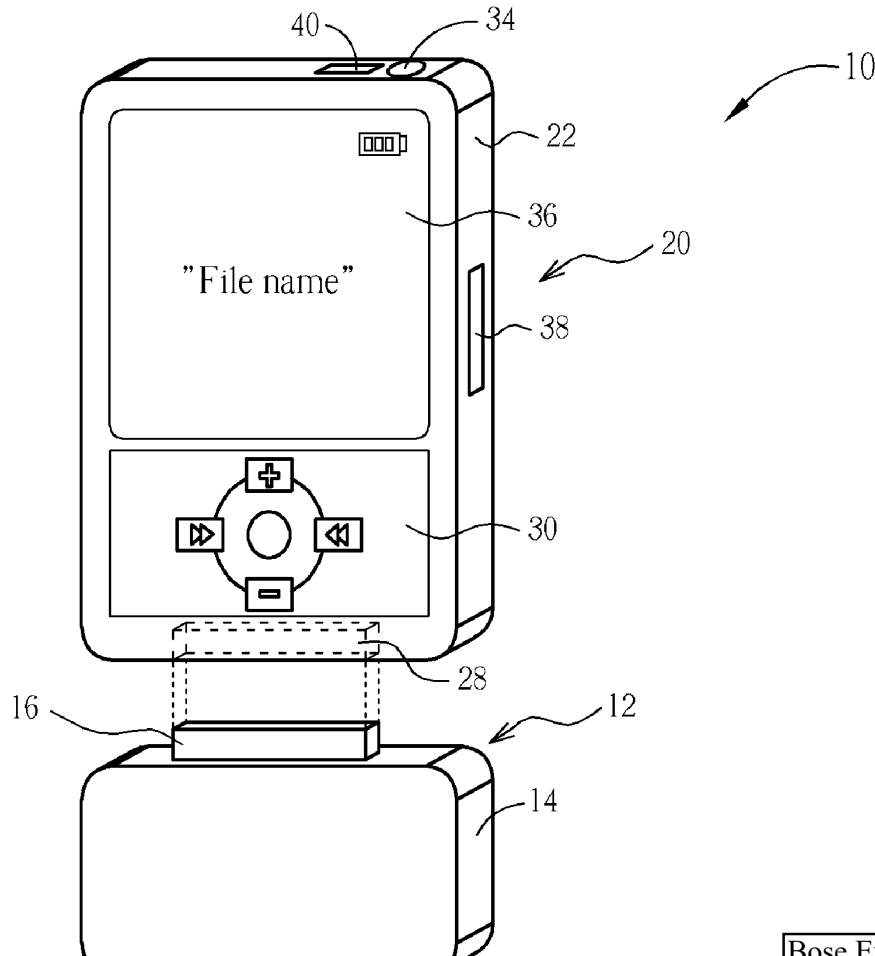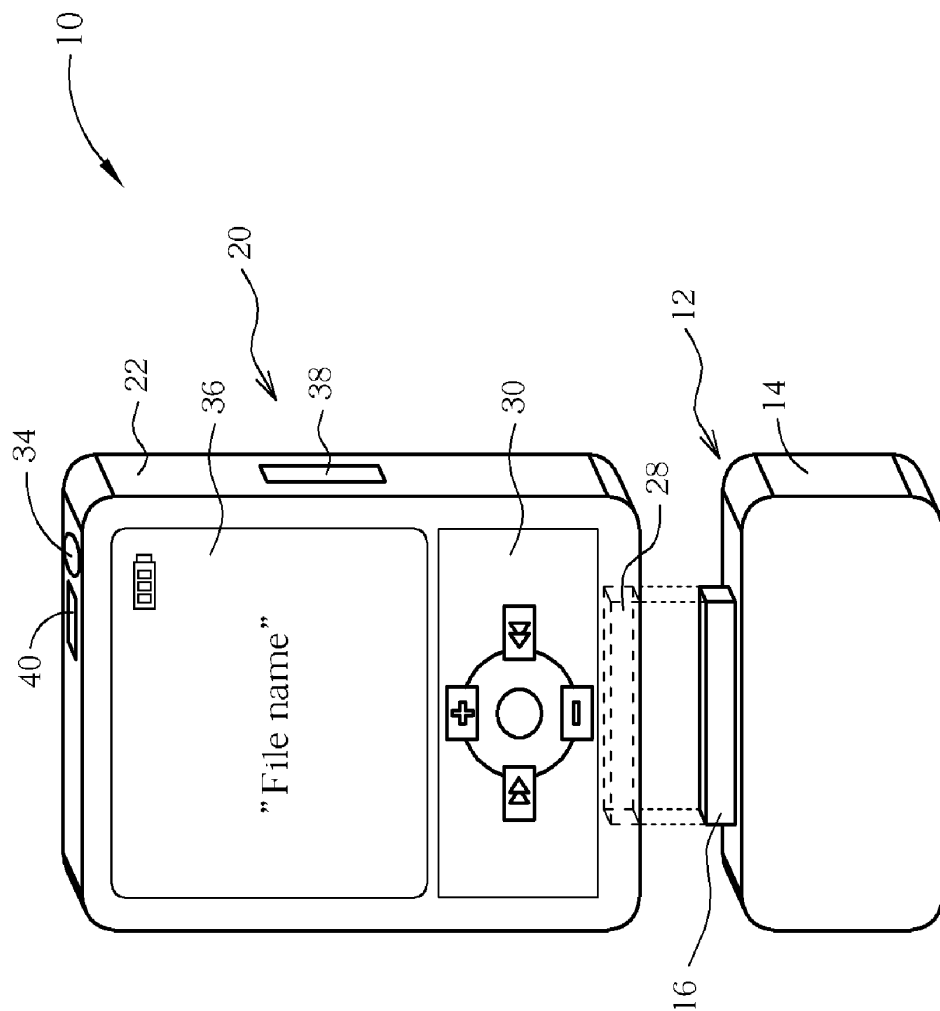
Fig. 1
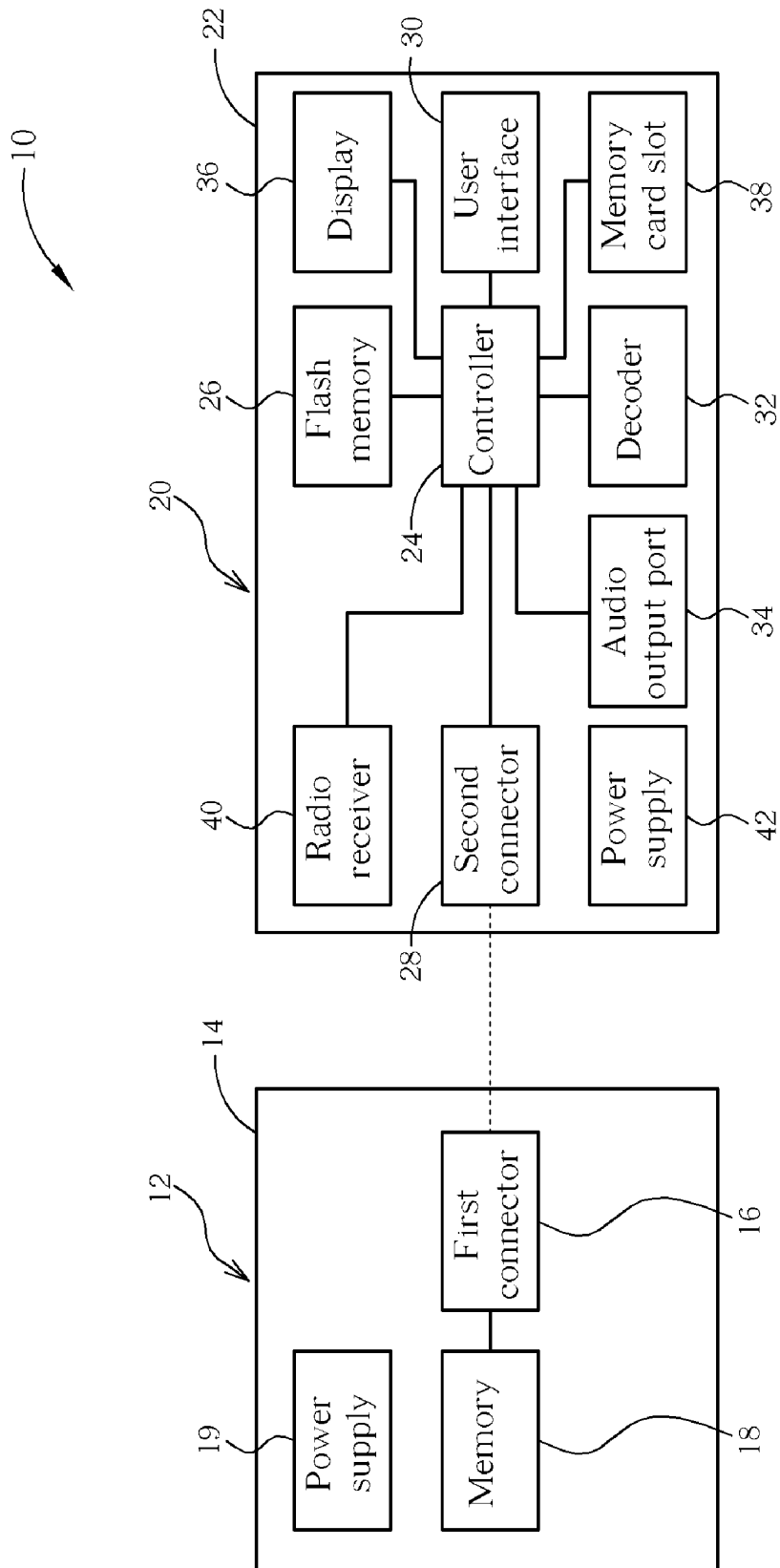
Fig. 2

SOUND PLAYER WITH A SEPARABLE MEMORY

BACKGROUND OF THE INVENTION

[0001]   1. Field of the Invention

[0002]   The present invention relates to a sound player, and more particularly, to a sound player with a separable memory.

[0003]   2. Description of the Prior Art

[0004]   With the advent of digital music being readily available, users have a new source of musical content. Digital music content resides in relatively small digital files that can be stored on portable non-volatile memory devices. Due to the popularity of digital music, portable music players such as Moving Pictures Expert Group, Layer 3 (MP3) players, as well as other types of music players can be found everywhere.

[0005]   Generally there are two kinds of MP3 players, classified according to the format of the memory used for storing music data. One utilizes flash memory, and the other utilizes hard disks. The MP3 player with the flash memory is popular for its small size and its light weight. However, the MP3 player with the flash memory has a fixed amount of memory available for storing digital music. As an example, suppose that the flash memory has a capacity of 64 MB, which can store about one hour of digital music in the MP3 format. If the user wishes to go on an extended trip, he will quickly run out of new songs to listen to on the MP3 player due to the small capacity of the flash memory. In order to overcome these problems, the user must buy multiple MP3 players. Unfortunately, having more than one MP3 player greatly increases the cost associated with enjoying digital music. To overcome the drawback of memory capacity of the MP3 player with the flash memory, the MP3 player with the hard disk is designed for enlarging the amount of memory for storing digital music data. However, an MP3 player with a hard disk has the disadvantages of having a heavy weight, consuming more electricity, and being fragile. Hence there is a need to combine the advantages of the two MP3 players for providing users with a better portable music player.

SUMMARY OF THE INVENTION

[0006]   It is therefore a primary objective of the claimed invention to provide a sound player with a separable memory.

[0007]   According to the claimed invention, a sound player includes a first module, a first connector, and a memory electrically connected to the first connector for storing digital audio data. The sound player further includes a second module, a controller for controlling the operation of the sound player, a flash memory electrically connected to the controller for storing digital audio data, a second connector electrically connected to the controller for connecting to the first connector in a detachable manner, a user interface to input a signal to the controller for selecting digital audio data stored in the flash memory of the second module or for selecting digital audio data stored in the memory of the first module through the first connector and the second connector, a decoder for converting selected digital audio data into

[0008]   These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]   **FIG. 1** is a drawing of a sound player according to the present invention.

[0010]   **FIG. 2** is a functional block diagram of the sound player in **FIG. 1** according to the present invention.

DETAILED DESCRIPTION

[0011]   Please refer to **FIG. 1** and **FIG. 2FIG. 1** is a drawing of a sound player **10** according to the embodiment of the present invention, and **FIG. 2** is a functional block diagram of the sound player **10** according to the embodiment of the present invention. The sound player **10** can be an MP3 player. The sound player **10** includes a first module **12** and a second module **20**. The first module **12** includes a first housing **14**, a first connector **16**, a memory **18**, and a power supply **19**. The second module **20** includes a second housing **22**, a controller **24**, a flash memory **26**, a second connector **28**, a user interface **30**, a decoder **32**, an audio output port **34**, a display **36**, a memory card slot **38**, a radio receiver **40**, and a power supply **42**.

[0012]   The first connector **16** of the first module **12** is installed on the first housing **14**. The memory **18** is installed inside the first housing **14** and electrically connected to the first connector **16** for storing digital audio data. The memory can be a hard disk having an IDE interface or a USB interface. The power supply **19** supplies power to the first module **12** and can be a battery.

[0013]   The controller **24** is installed inside the second housing **22** for controlling the operation of the sound player **10**. The flash memory **26** can be a NAND flash memory and is installed inside the second housing **22** and electrically connected to the controller **24** for storing digital audio data. The second connector **28** is installed on the second housing **22** and electrically connected to the controller **24** for connecting to the first connector **16** in a detachable manner. The user interface **30** is electrically connected to the controller **24** and operable to allow a user to input a signal to the controller **24** for selecting digital audio data stored in the flash memory **26** of the second module **20** or for selecting digital audio data stored in the memory **18** of the first module **12** through the first connector **16** and the second connector **28**. The decoder **32** is installed inside the second housing **22** and capable of converting the digital audio data selected by the user interface **30** into audio signals. For example, the decoder **32** can be an MP3 decoder for converting the digital audio data of MP3 format into audio signals or can convert the digital audio data of WMA format into audio signals. The audio output port **34** is capable of outputting the audio signals converted by the decoder **32**. The audio output port **34** can be an earphone or a speaker operable to allow a user to listen to the sound played by the sound player **10**. The display **36** is capable of displaying an operation status of the sound player **10**, such as the selected music files, the selected broadcaster, or the capacity of the

memory card. The radio receiver **40** is capable of receiving radio signals, such as FM or AM radio signals, and is capable of outputting audio signals corresponding to the radio signals to the audio output port **34**. The power supply **42** is capable of providing the electricity to the second module **20**. The power supply **42** can be a battery or can receive the electricity from an external power supply. In addition, the power supply **19** of the first module **12** can receive the electricity from the power supply **42** of the second module **20** for providing the electricity to the first module **12**.

[0014] The characteristic of the present invention is that the sound player **10** includes the two parts, the first module **12** and the second module **20**. The data transmission between the first module **12** and the second module **20** is through the connection of the first connector **16** and the second connector **28**. The first connector **16** and the second connector **28** can use the USB interface, such as USB 1.0, USB 2.0, or USB OTG, the IEEE 1394 interface, or the IDE interface. If the first connector **16** is a USB connector and the memory **18** of the first module **12** is a hard disk of the IDE interface, the first module **12** can further include a USB/IDE interface converter for converting data between the USB interface and the IDE interface. As shown in **FIG. 1**, the first connector **16** is a male connector and the second connector **28** is a female connector. The connection between the first connector **16** and the second connector **28** can also use other types and standards besides the ones mentioned above. When the first module **12** and the second module **20** are connected through the connection of the first connector **16** and the second connector **28**, the user can select the digital audio data stored in the flash memory **26** of the second module **20** or the digital audio data stored in the memory **18** of the first module **12** through the connection of the first connector **16** and the second connector **28** by the user interface **30**. Therefore, the total capacity for storing digital audio data in the sound player **10** is the sum of the capacity of the flash memory **26** and the capacity of the memory **18**. The combination of the first module **12** and the second module **20** is similar to an MP3 player with a hard disk in the prior art. The first module **12** is similar to an external hard disk for connecting to a computer to download digital audio data to the memory **18** of the first module **12**. After downloading digital audio data from the computer and storing digital audio data to the memory **18** of the first module **12**, the first module **12** can be disconnected from the computer and be connected to the second module **20**. After the controller **24** of the second module **20** detects the connection of the first connector **16** and the second connector **28**, the first module **12** can be regarded as a slave device. And then the user interface **30** is operable to allow the user to select the digital audio data stored in the flash memory **26** of the second module **20** or the digital audio data stored in the memory **18** of the first module **12** through the connection of the first connector **16** and the second connector **28**. The user also can backup the digital audio data stored in the memory **18** of the first module **12** to the flash memory **26**. If the user wants to take the sound player **10** outside for a long time, like going on a trip, the first module **12** can be connected to the second module **20** for storing more digital audio data.

[0015] When the first module **12** is disconnected from the

second connector **28**. And then the user interface **30** is operable to allow the user to select the digital audio data stored in the flash memory **26** of the second module **20**. The second module **20** which is stand-alone is similar to an MP3 player with a flash memory in the prior art and is light, portable, and electricity-saving. The second module **20** is capable of reading data stored in an external memory card through the memory card slot **38** so as to be a card reader. The source of the digital audio data stored in the flash memory **26** of the second module **20** can be from the memory **18** of the first module **12** through the connection of the first connector **16** and the second connector **28**, or from the external memory card through the memory card slot **38**. If the user has no need to listen a large number of digital audio data ordinarily, the second module **20** can function as a stand-alone MP3 player and have the advantages of being light, portable, and electricity-saving.

[0016] In contrast to the conventional MP3 player, the sound player according to the present invention combines the advantages of the MP3 players with a flash memory and those with a hard disk. If the user wants to take the sound player **10** outside for a long time, such as when going on a trip, the first module can be connected to the second module for storing a large number of digital audio data. If the user has no need to listen a large number of digital audio data ordinarily, the second module can be a stand-alone MP3 player for being light, portable, and electricity-saving.

[0017] Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

What is claimed is:

1. A sound player comprising:

a first module comprising:

a first connector; and

a memory installed electrically connected to the first connector for storing digital audio data; and

a second module comprising:

a controller for controlling the operation of the sound player;

a flash memory electrically connected to the controller for storing digital audio data;

a second connector electrically connected to the controller for connecting to the first connector in a detachable manner;

a user interface electrically connected to the controller to input a signal to the controller for selecting digital audio data stored in the flash memory of the second module or for selecting digital audio data stored in the memory of the first module through the first connector and the second connector;

a decoder for converting the digital audio data selected by the user interface into audio signals; and

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